ZANZIBAR PROTECTORATE

ANNUAL REPORT

ON THE

DEPARTMENT OF AGRICULTURE

for the year ended 31st December, 1945

Price: Shs. 2/-

ZANZIBAR
Printed and Published by the Government Printer
1946

DEPARTMENT OF AGRICULTURE.

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SECTION I.

AGRICULTURE IN THE PROTECTORATE.

GENERAL.

1. The Department of Agriculture, with the assistance of the District Administration, has continued to press for the greater production of foodstuffs and animal products with all the means at its disposal. Its experimental advisory work on the permanent major export crops of the Protectorate, cloves and coconuts, has been maintained and extended, and much attention given to the development of a new export crop—Cacao. Minor export crops, such as tobacco, chillies, and fruit have also received attention. Confidence has been restored in the mangrove bark export trade through the introduction and administration of new legislation which defines standards of export quality.

2. Much time has been devoted to the formulation of a ten-year Agricultural Development Programme. The estimated cost is £178,357, for which application has been made under the Colonial Development and Welfare Act. Briefly, the programme provides for a number of schemes relating to crop development, crop research, stock development and agricultural education, in addition to those which form the present work of the Department. The proposals under crop development include a survey of the prospects of developing certain selected crops for export and home consumption, such as cacao, papain, derris, chillies, cashews, and cassava starch for overseas markets; tobacco and fruit for adjacent mainland markets; and rice, green vegetables, fruit, sorghum, coffee, and oil palms for home consumption. Field experimentation and demonstrations will be undertaken on outlying stations, to be established in due course, where facilities such as small processing units and cattle dips will be provided for the use of local farmers. A survey of the forest areas and resources, including the mangrove swamps, is proposed, together with preparation of plans for their proper utilization and development. The proposals for research into the many aspects of clove cultivation, cropping, reproduction, and diseases have, on the advice of the Secretary of State, been referred to the East African Standing Committee for Agricultural Research. An educational course for young prospective farmers is proposed, this to be combined with the present scheme at the Kizimbani Experiment Station for training candidates for junior appointments in the Agricultural Department.

WEATHER.

3. The rainfall of the year has been considerably below the average in all districts in Zanzibar as compared with the average for the past ten years and a little below the average in Pemba when compared with the same period. The distribution was generally unfavourable to crop production in both islands, ranging from almost drought conditions to occasional flooding in certain parts of Pemba. At the Kizimbani Experiment Station, a clove growing area, 57.48 inches were recorded as compared with an average of 74.71 for the past ten years. At Wete, Pemba, the figures were 78.81 for 1945 and 79.86 for the average of the ten-year period. As a result of the prolonged dry conditions there was a restriction of the planting period for food crops and also lower yields. In contrast to this, at one period cassava rotted in the ground in certain flooded, low areas of Pemba. These variable conditions caused a serious set-back to food production with the exception of rice which did not unduly suffer.

THE PRINCIPAL CROPS.

4. *Cloves.*—As is well-known the clove crop varies very considerably annually. The calendar year, when a very small crop was reaped, was no exception. Widely fluctuating yields do not, however, on account of large stocks held locally, materially affect exports. The exports for the calendar year were approximately 18,350,080 lbs., some 3,875,040 lbs. more than in the previous year and some 3,627,344 lbs. less than the average of the last 12 years.

5. Actual production is estimated, for a seasonal year ending on June 30th, from purchases of new season cloves at the Central Market and at the Clove Growers Association. This does not, however, represent an accurate picture of production, as stocks may be held by producers until long after the close of the season. The seasonal year is divided into two approximate periods, the Mwaka (June - November) and the Vuli (December - January). The Pemba seasons are usually about one month later than in Zanzibar.

6. On this basis production for the seasonal year ending June 30th, 1945 was 23,093,455 lbs. of which 16,078,860 lbs. were from Pemba and 7,014,595 lbs. from Zanzibar.

7. The 1945/46 crop promises to be one of the smallest for many years and not likely to exceed 7,000,000 lbs. At the end of December deliveries from Pemba were some 2,222,030 lbs. and Zanzibar 396,635 lbs., a total of 2,618,665 lbs. with practically no Vuli crop remaining on the trees.

8. There was a disinclination on the part of some growers to pick the small crop as it was not thought large enough to compensate for the damage to the trees caused by picking and the consequent reduction in the following season's crop.

9. The selling prices of the Clove Growers Association to local dealers remained unchanged at Shs. 55.00 per 100 lbs. for first grade, Shs. 52.00 for second grade and Shs. 49.00 for third grade. There was also no change in the Clove Growers Association's guaranteed minimum buying prices which remained at Shs. 44.50 for good quality cloves, Shs. 42.00 for fair quality, and Shs. 39.00 for poor quality, delivered at the Association's depôt in Zanzibar. The local open market buying prices were considerably above the guaranteed minimum price offered by the Clove Growers Association for the greater part of the year, reaching, for second grade cloves, as high as Shs. 60.00 in May. At the end of the year ruling prices in the open market were Shs. 49.25—Shs. 49.50 per 100 lbs. The principal export market in 1945 was India, followed by the United States of America and the United Kingdom.

10. The exports of clove oil, 525,313 lbs., constitute a record. Owing to the small crop of cloves the quantity of stems was insufficient to meet the demand of the distillery, and large quantities of low grade cloves were utilized. Sales were mainly to the United Kingdom where distribution was controlled, but also to the United States of America and Australia where good prices were obtained. The price paid by the Clove Growers Association for clove stems was raised by Shs. 2.00 to Shs. 12.00 per 100 lbs.

11. In the absence of a clove crop there was no demand for imported pickers and little demand for any hired labour at all on the plantations; in fact in Pemba local labour had to seek other employment which was mainly found in stripping mangrove bark.

12. Casualties from sudden death in the oldest plantations continued to be severe in Zanzibar, but few cases were recorded from Pemba.

13. *Coconuts.* Similar arrangements for the disposal of the exportable surplus of copra prevailed as in recent years whereby the entire exports were shipped, under arrangements with the Ministry of Food, to Kenya and the Middle East. The exportable surplus of coconut oil was dealt with in a similar manner, destinations being Aden and Cyprus.

14. There was a revision of the prices paid by the Ministry for both copra and coconut oil. They took effect at the beginning of December and were as follows :—

Copra F.M.S.	in bags f.o.b. £21-12-9 per ton
Copra F.M.	in bags f.o.b. £20-19-7 per ton
Coconut Oil naked	f.o.b. £39- 6-0 per ton

These prices, although representing an increase of £3.1.6 per ton on first grade copra, £2.19.7 on second grade and £5.2.6 on coconut oil, actually did no more than allow for the estimated increase in cost of production since the prices were last revised.

15. Exports of copra for the year amounted to 9,816 tons, which was considerably less than the 14,550 tons shipped during the previous year and some 20% below the average of the previous four years. Coconut oil exported amounted to 525 tons as compared with 393 tons in the previous year and the quantity of coconuts exported, 1,051,980, was more than doubled. Local consumption of copra is estimated at some 6,000 tons, part being used for oil for local consumption, and part for the manufacturing of soap. Of the latter commodity, approximately 1,011 tons were exported—an appreciable increase on the exports of 650 tons in 1944. Approximately 20 tons of coir and coir rope were also exported.

16. Local prices, which had remained steady almost throughout the year, reacted immediately in December when the increase in prices for copra and coconut oil were announced. Best sundried quality copra ranged in prices from Shs. 14.28 to Shs. 16.75 per 100 lbs. until December when it advanced to Shs. 16.43 to Shs. 19.05. Supplies of this grade were obtainable only from Government Plantations. Fair mercantile sundried quality ranged in price from Shs. 13.57 to Shs. 15.43 advancing at the end of the year to Shs. 15.71 to Shs. 17.71. Fair mercantile quality ranged from Shs. 13.42 to Shs. 15.29, rising later to Shs. 15.43 to Shs. 17.43.

17. Average sales from Government Plantations within the quality standards given above were as follows:—

	January—mid December.	December latter half.
B.S.D. per 100 lbs.	Shs. 16.38	Shs. 19.03
F.M.S. per 100 lbs.	Shs. 15.08	Shs. 17.65

The percentage of B.S.D. produced on Government Plantations was 85.6 and of F.M.S. 14.4. No. F.M. was produced.

18. Prices of coconuts ranged from Shs. 37.00 to Shs. 49.00 per 1,000, dependent on location and quality, advancing to Shs. 56.00 in December. Sales from Government Plantations averaged Shs. 45.44 for the period January to 18th December and Shs. 55.57 for the rest of December.

19. *Standard of Quality.*—Unfortunately the standard of quality for the Protectorate as a whole cannot be regarded as more than fair, and considerably more care and attention is necessary not only to restrict the gathering to fully mature nuts but also as regards the subsequent preparation of the copra. Certain copra makers continued to produce a good quality product, and their example needs to be followed by copra makers in general.

20. *Mangrove Bark.*—During the earlier part of the year mangrove bark was exported in considerable quantities. This was mainly derived from *Rhizophora mucronata* and a small quantity of *Bruguiera gymnorhiza*, mainly from Pemba. Much of this bark was insufficiently dried, subsequently suffered rain damage, and as a result moulding, blackening, and loss of tannin occurred, thereby injuring the appearance and value of the product. The position became so bad that shippers were involved in heavy losses from abroad and cutting came to a standstill.

21. On representations from the Chamber of Commerce and after discussion with that body and other interested parties legislation was enacted to control the period and manner of cutting, adulteration, local transport, and export, and rules under the Adulteration of Produce Decree (Cap. 120) and Agricultural Produce Decree, No. 13 of 1937, took effect as from the 1st August. Bark shippers and merchants were informed of the new rules by the Information van and by visits from an agricultural assistant.

22. The introduction of this legislation and its strict administration created confidence in markets abroad, prices rose, and cutting was resumed on a much larger scale until the close of the dry weather when it was discontinued by law. Incidentally the mangrove trade was of considerable benefit to Pemba seeing that the clove crop was particularly small.

23. The Agricultural Officer, Pemba, visited all the main mangrove areas to ascertain what quantity of mature Rhizophora of more than 8″ diameter, the minimum diameter prescribed by law for cutting, remained standing. In the

easily accessible creeks on the West Coast all mature Rhizophora has been cut, and in the less accessible East Coast creeks, the position is almost the same. The two most remote areas of the Micheweni peninsular in the north and Matumbini island in the south still contain large quantities of mature Rhizophora, but probably not more than 10,000 tons of bark. In addition, there are large numbers of Bruguiera trees which are harder to strip and consequently unpopular with the strippers. There has been a considerable wastage of bark due to methods of stripping on the part of some cutters whereby the bark is only taken from the more accessible parts of standing trees, instead of felling the tree and stripping all its bark. Steps have been taken to control this by the staff of the District Administration.

FOOD CROP PRODUCTION.

24. The production of foodstuffs was no less important in 1945 than in any former war year and the same means of propaganda, compulsory planting orders, and inspection of farms, as hitherto, was employed to attain the desired ends.

25. The supply of starchy foods, including rice, was well maintained for the greater part of the year but the late grain crops, especially from the Eastern seaboard, have owing to the light rains been very disappointing.

26. The campaign falls into the following main categories, and appropriate orders have from time to time been published dealing with most of these. There is, of course, a good deal of overlapping between the different planting operations detailed and they are by no means confined to the months indicated.

Month.	Upland Crop.	Rice Areas.
January—February	—	Rice.
March	Early Sweet Potatoes	—
April	Sorghum and Maize	—
May—June	Cassava and Sweet Potatoes	—
July—August	—	Pulses and Sweet Potatoes.
September	Sweet Potatoes and Cassava	—
October	Sweet Potatoes, Cassava and Pulses	—
November	Cassava	—
December	Sweet Potatoes (For Cuttings)	Rice.

27. Broadly speaking the greatest importance is attached to the rice crop and to the Mwaka and Vuli plantings of cassava and sweet potatoes. In Pemba at any rate sweet potatoes used not to be a very popular crop, but the people are rapidly becoming accustomed to them.

28. The planting of pulses in the rice stubbles is an innovation, and accordingly the same pressure cannot be brought to bear as in the case of crops to which the people are accustomed. Nevertheless, a very fair measure of success has been obtained, though many Pemba people prefer to graze their rice stubbles and plant pulses as a catch crop in the Vuli rains.

29. The following figures give some idea of rice production in both islands.

	Estimated Acreage.	Average Yield per acre. lbs.	Estimated production of paddy. tons.
Zanzibar	15,430	1,210	8,368
Pemba	14,500	1,535	10,000
	29,930		18,368

30. In terms of clean rice this is equivalent to 11,016 tons, which has allowed rice growers not only to provide for their own needs but also to dispose of considerable quantities to non-producers and townsfolk. This contribution has been invaluable in view of the further reduction in the supply of imported rice.

31. Sixty-seven cwt. of green gram and seventy cwt. of cowpea seed were imported for sale to cultivators in need of seed. In addition to this paddy and other seed of staple crops was supplied from Kizimbani, Mkwajuni, and Limbani in Pemba.

32. As regards foodstuff deliveries to the town of Zanzibar supplies for the whole year were 9,278 tons compared with an estimated figure for 1944 of 8,568 tons. The supply of sweet potatoes decreased very sharply but was more than compensated for by cassava.

33. Vegetable deliveries totalled 48,654 baskets as compared with 40,300 in 1944 and 24,300 in 1943. There is a definite tendency for vegetable growing to increase and, with the development scheme at present envisaged, it does not seem likely that Zanzibar will ever again become dependent on the mainland as in the past.

DOMESTIC EXPORTS.

34. The table below gives particulars of the exports of domestic produce. Cloves, and clove and stem oil, comprise 68.57% of the total and coconuts and coconut products some 24.98%. Comparative figures for the previous year were 62.18% and 34.12% respectively. There has been a marked increase in the value and quantity of mangrove bark exported, 4,876 tons valued at £50,217 as compared with 1,741 tons valued at £15,491 in 1944, a percentage of 5.02 of total domestic exports as compared with 1.78 in 1944. Unfortunately exports of mangrove bark at this rate cannot be long maintained, and very approximate estimates place the total available supply for the near future at not more than 10,000 tons.

35. The total domestic exports from the Protectorate amounted to some 25,682 tons valued at £1,001,201 as compared with 24,200 tons valued at £867,821 for 1944.

Item.	Unit.	Quantity.	1945 Declared Value. £	Per cent of total Value.
Cloves	cwt.	163,834	586,176	58.55
Clove and Stem Oil	lbs.	525,313	100,362	10.02
Copra	tons	9,816	177,540	17.73
Coconuts	Nos.	1,051,980	3,520	0.35
Coconut Oil	lbs.	1,176,256	19,750	1.97
Oil Cakes	cwt.	18,900	7,731	0.78
Common Soap	cwt.	20,230	40,795	4.08
Coir	tons	19	741	0.07
Fresh Fruit	—	—	10,078	1.01
Vegetables	cwt.	103	192	0.02
Tobacco	lbs.	65,153	1,628	0.16
Chillies	cwt.	60	240	0.02
Mangrove Bark	tons	4,876	50,217	5.02
Ox Hides	cwt.	549	1,447	0.14
Sheep and Goat Skins	Nos.	17,497	784	0.08
	Total		1,001,201	100.00

SECTION II.

WORK OF THE DEPARTMENT OF AGRICULTURE.

GENERAL.

36. *Staff.*—Mr. R. O. Williams, O.B.E., Director of Agriculture, arrived on transfer from Trinidad on 28th April and prior to this Mr. R. M. Davies, Senior Agricultural Officer, acted as Director of Agriculture. Mr. Davies proceeded on leave prior to transfer to Tanganyika Territory as Land Settlement Officer on 11th July and Mr. O. S. Swainson, Senior Agricultural Officer, arrived on 17th July on transfer from Nigeria. Mr. J. E. Baker, Agricultural Officer, who was seconded for duties with the Economic Control Board, reverted to the Department on 20th November and relieved Mr. I. G. C. Squire, Manager of Plantations, who proceeded on leave on 18th December. Mr. F. B. Wilson, M.B.E., Agricultural Officer, was in charge of Kizimbani Experiment Station throughout the year in addition to performing the duties of Civil Reabsorption Officer as from 16th May. Mr. A. K. Briant, Agricultural Officer, proceeded on long leave in early January and returned on 13th November. Mr. G. E. Tidbury, Agricultural Officer, was on duty in Pemba throughout the year. Mr. L. W. Raymond, Government Chemist, continued on full time duties at the Secretariat. Mr. A. C. E. Callan, Inspector of Produce, in addition to performing his normal duties, was appointed Naval Reporting Officer on 3rd April. The Director undertakes the functions of Food Controller and is a member of the Economic Control Board. He was also appointed a member of His Highness's Executive Council on 3rd October, 1945.

37. *Rubber.*—2,505 lbs. of wild rubber was purchased and exported during the year. Cost of production was much above the market value and the difference was met from Government funds.

38. *School Gardens.*—The Department continues to give as much assistance as possible in the supervision of School Gardens, but the incidence of school holidays and other problems inseparable from these institutions, makes progress rather uneven. The Assistant Agricultural Officer in charge of Agricultural Education is to be transferred from the Education to the Agricultural Department at the beginning of 1946.

39. *Compost Manufacture.*—Over 1,000 tons of compost were manufactured at Marhubi of which the following was disposed of up to the end of December.

		Tons.
Free to Marhubi Vegetable Gardens	...	363
Sold	...	596
		959

40. *Distribution of other Plants and Seeds.*—The Department continued to assist vegetable producers by maintaining a stock of seeds for sale to approved growers. Apart from vegetables the following planting material was also distributed during the year.

	Zanzibar.	Pemba.
Budded Citrus	1,777	27
Other Citrus	221	—
Other Fruit Trees	484	21
Coffee	—	378
Ornamental Plants	105	—
Pineapple Suckers	650	—
Cassava Cuttings	402,000	125,120
Sweet Potato Cuttings	330,000	359,960
Rice Seedlings	98,000	11,400
Rice Seed	1,646 lbs.	308 lbs.
Other Cereal Seeds	3,358 ,,	960 ,,
Pulse Seeds	2,472 ,,	5,408 ,,
Groundnut Seed	874 ,,	—
Other Seed	251 ,,	2 ,,

41. *Clove Regeneration.*—The Clove Regeneration Scheme continues to work successfully and the following numbers of seedlings were distributed during the year :—

	Zanzibar.	Pemba.
Government Subsidised		
Sold	66,663	55,229
Free Distribution	22,100	1,000
C.G.A. Subsidised		
Free	22,200	19,648
Total	110,963	75,877

There were also established in nurseries for planting in 1946 the following :—

	Zanzibar.	Pemba.
Government Subsidised		
For Sale	70,000	60,000
Free Distribution	70,000	30,000
C.G.A. Subsidised		
Free Distribution	30,000	20,000
Total	170,000	110,000

42. Owing, however, to shortage of seed and the almost complete failure of the Clove Growers Association Nursery at Mwakaje, only approximately 141,000 seedlings in all will be available in Zanzibar. The Pemba figure will be in excess of the estimate.

43. In Pemba, where "Sudden Death" has never been as serious as in Zanzibar, regeneration has been so successful that there is now some slackening in the demand for seedlings.

GOVERNMENT PLANTATIONS.

44. From the summarised statement (Appendix I) at the end of the report it will be seen that the Government Plantations show a loss of approximately Shs. 7,500.00 on the year's working. There was virtually no clove crop at all during 1945, and the revenue shown as accruing from cloves represents a carry over from the 1944 Vuli crop which ended on January 5th 1945.

45. The coconut harvest for the year was well below average but the average price for whole nuts was appreciably higher than during the previous year. The higher prices obtainable for copra produced on Government Plantations as compared with exports in general are shown in the Coconuts Section. There has been no sales of land during the year and the area controlled by the Manager of Plantations remains at approximately 5,043 acres. During the year 2,508,171 nuts were dealt with as follows :—

	Nuts.		Nuts.
Brought forward	244,600	Made into copra	2,187,693
Gathered	2,263,571	Sold on the heap	247,312
		Unsaleable	21,522
		Used for seed	7,000
		Destroyed by fire	10,000
		Carried forward	34,644
	2,508,171		2,508,171

The year's harvest was 12.67% less than the average of the previous four years.

46. Wages of climbers and gatherers increased from Shs. 5.00 to Shs. 6.00 per 100 trees and 1,000 nuts on 12th January, 1945.

47. Three hundred and forty-three tons of copra were made at an average of 6,378 nuts per ton, and it was sold at an average of Shs. 16.07 per 100 lbs. for the entire year.

48. During the rains 7,404 clove seedlings were transplanted to the field as follows:—

	Sites.	Seedlings.
Supplying old clove areas	1,453	2,848
Supplying regeneration areas	1,062	2,124
New regeneration areas	1,216	2,432
	3,731	7,404

1,975 coconut seedlings were planted out during the year.

49. The Ceylon kiln at Mdo was unfortunately destroyed by fire towards the end of the year.

EXPERIMENT STATIONS.

50. Two most interesting projects connected with land drainage and reclamation now form a portion of the activities at Kizimbani Experiment Station. The first is the draining of the Tomokani Swamp, a depression of some 25 acres on Government land which invariably became deeply flooded during the long rains. This work, which involved the digging of a drain some 800 yards long, was undertaken with the co-operation and assistance of the interested cultivators, who themselves provided 270 days of voluntary unpaid labour. The drain functioned perfectly in the 1945 rains and the work seems to have been completely successful.

51. The second project, the draining and partial irrigation of 500 acres of the Mwera River basin at Bumbwi and Kinuni Moshi, is being carried out with the co-operation of the Prison Department and largely with the assistance of Prison labour. The Agricultural Officer in charge of Kizimbani and the Superintendent of Prisons constitute a Board of Management, appointed by His Excellency the British Resident, to manage the Prison farm, and so far operations, which affect land suitable for rotational crops in the off season as well as for rice in wet weather, have been very successful. The possible extension of such schemes to other areas might well in time add many thousands of tons of rice and ground crops to the Protectorate's food supply.

52. The work on the model village at Kizimbani has been continued. Further quarters for married labourers were constructed, twelve houses to accommodate returned ex-servicemen were completed, a village shop and a dispenser's house have been built, and general improvements to the layout effected. Constructional work has been very greatly facilitated by a technique which embodies the prior erection of concrete pillars to carry the roof, after which the walls, having no weight to bear, can be built, at leisure, of almost any material. In every case a concrete raft was laid over the whole area of the house at floor level, thus making the building, so far as is reasonably possible, termite proof.

53. Visitors to the station have been more frequent than ever and many senior officials and residents, including His Excellency Sir Guy Pilling, K.C.M.G., the then British Resident, His Excellency Major E. A. T. Dutton, C.B.E., the Acting British Resident, and Prince Abdulla bin Khalifa, C.M.G., have visited Kizimbani one or more times. Equally important have been visits from Arab shamba owners, Mudirs, Shehas, and peasant cultivators, all of whom have shown the keenest interest in the work in progress.

54. During the year the whole of the three year course of instruction to pupils was revised and a comprehensive syllabus prepared which will commence in 1946. An intensive practical course, covering two whole days per week, was given during their third term to the teachers in training at Dole. Owing to shortage of staff it was only found possible to give one complete term of lectures to the pupils, and their main instruction, therefore, consisted of practical work in the various sections of the station. Examinations were held at the end of the year and the three third year pupils were successful in passing all subjects.

55. Several demonstrations as to the value of rotational cropping of paddy land were given at various centres, and a large demonstration on the value of bunding laid out at Cheju in November. Monthly lectures and demonstrations on Agricultural subjects were arranged for the prisoners at Langoni and Kinuni Moshi camps. These proved extremely popular.

56. *Cloves.*—The almost complete absence of any crop has made it practically impossible to report on the various manurial and establishment trials which form the main part of our experimental work on this crop at the present time. Further progress can, however, be reported with regard to the trial and demonstration of practical methods of regeneration of old clove stands affected by "Sudden Death". In addition distinct advances have been made in the study of temporary food and cash crops which can profitably be grown between the young clove plants during the period before they come into full bearing.

57. In the artificial manuring of clove seedlings trial on Block KBB where there is a 30 foot space between the rows it was becoming obvious that ordinary hoeing methods were not effectively controlling Imperata grass, and it was therefore decided to try the effect of a cleaning crop followed by a leguminous one. Three six foot ridges were dug between each row of cloves, and the centre ridge planted with rooted cuttings of Kudzu (*Pueraria thunbergiana*), while the outer ridges were planted with a sweet potato and cowpea mixture. Pemba grass was planted in the actual clove rows. The outer ridges were effectively cleaned by their cropping, and by the end of the Vuli the Kudzu had covered the whole cultivated area and scarcely a plant of Imperata grass could be seen.

58. This block did give a small harvest from about 60% of the trees, and the yields, though too small to justify statistical analysis, are of interest.

Treatment.	Survey of Saplings in Four Blocks.	Yield in lbs. Green Cloves.	Average Yield per tree.
Control	45	78.9	1.7
N	43	244.3	5.7
P	52	90.2	1.7
K	46	50.5	1.1
NP	40	127.7	3.2
NK	38	257.1	6.8
PK	42	115.2	2.7
NPK	48	256.1	5.3
Total and Average	354	1220.0	3.4

59. In the Clove Regeneration Gradual Reduction of Canopy Trial in Block KPA all the original old trees are now dead. At the beginning of the year all the young saplings looked poor and thin, and, owing to the reduced soil protection produced by the removal of the old trees there were distinct signs of erosion. It was, therefore, decided to intercrop and, as on Block KBB, three six foot ridges were made between each row of cloves. The centre ridge was planted with tannias and sweet potatoes and the outside rows with cassava and sweet potatoes. Pemba grass was again planted in the actual rows. This area is a practical demonstration and not experimental, but it can be stated from observation that the intercropping has already produced a vast improvement in the condition of the young trees, which have produced good flushes of growth and assumed the bushy shape characteristic of good health.

60. In the Regeneration of Cloves under various nurse crops and shade trees trial the trees are growing well under all treatments except Uba Cane. Interim observations are summarised in the following table.

Treatment.	Total No. Survivors.	Average Height in Feet.	Average Girth in Inches.	Girth x Height in Inches
Uba Cane	294	4.7′	2.7″	152.3″
Banana	299	5.6′	3.0″	201.6″
Cassava	307	5.3′	3.0″	190.8″
Gliricidia (with Calapogonium)	287	5.8′	2.4″	167.2″
Gliricidia (alone)	320	6.3′	2.8″	211.7″

These interim measurements confirm previous observations that the trees under banana and Gliricidia shade are the most vigorous and healthy. The Uba cane provides no top shade and presumably draws very heavily upon the soil moisture.

61. During the year there have been three casualties from among the six cloves grafted on guava stocks which were alive at the end of 1944. One of the plants never got a really good start and the death of the other two can be directly attributed to termites. Of the remainder only one is really flourishing.

62. As a result of leaf samples sent to Dr. Wallace at Long Ashton a report was received which indicated that manganese was present in quantities which in England would be toxic and that the content of both calcium and phosphorus was below what would normally be the health limit. Other factors do not altogether support the view that any of these elements is likely to be the cause of "Sudden Death", but further leaf and soil samples have been taken from both healthy and affected areas in order to investigate these possibilities fully.

63. *Coconuts.*—So far as the Kizimbani area is concerned, the three following facts appear to be generally applicable.

1. Large areas of the estate, especially the poorly drained Eastern slope towards Kinuni Moshi, do not appear to be really suitable for coconuts.
2. Young palms in particular are much damaged by the cutting of leaves for making thatch and baskets, and it is virtually impossible to control this form of damage.
3. In red earth soils such as Kizimbani, where white ants are particularly bad, the establishment of young palms in the field is extremely difficult.

64. The results to-date of the manurial trial on Block KMDC, in which coconut meal and nitrogen plus potash are applied separately and in combination, do not appear to prove anything, but there is an indication that the three tons of lime applied throughout prior to the beginning of the experiment may have had a generally beneficial effect on yields.

65. *Pineapples.*—The manurial experiment was abandoned early in the year owing to the intrusion of noxious weeds which could not be controlled in anything approaching an economic manner.

66. The experience with pineapples in general, both at Kizimbani and Selem, indicates the absolute necessity for establishing this crop in land which is not only in really good heart but thoroughly cleaned. In this connection the Prison Department in a nearby valley have produced extremely good crops of reasonably even sized large fruit, so there still seems to be scope for investigation.

67. *Deli Oil Palms.*—The comparatively dry year has resulted in somewhat smaller bunches of fruit, though the total number exceeds that of any previous year. Some 21 diseased and poor type palms were dug up, burned, and replaced. The following is a table of comparative production at Kizimbani.

	1942.	1943.	1944.	1945.
Number of Palms	362	362	360	339
Number of bunches harvested	1,068	704	1,050	1,230
Average weight of bunch	15.8 lbs.	21.9 lbs.	30.5 lbs.	29.3 lbs.
Heaviest bunch	48 lbs.	58 lbs.	76 lbs.	68 lbs.
Average weight of fruit per bunch	10.5 lbs.	16.7 lbs.	26.0 lbs.	19.0 lbs.
Average weight of oil per bunch	1.01 lbs.	1.24 lbs.	2.1 lbs.	1.8 lbs.

68. It is noteworthy that the extraction of oil is rather less than 10% of the fruit weight, whereas in West Africa and other oil producing countries the Deli Oil Palm gives in the neighbourhood of 20%. The reason for this is not altogether clear, but it may lie somewhere between soil and climatic conditions, the uneven ripening of bunches, and the very small press at present used for extractions.

69. *Citrus.*—The orange plot at Kizimbani is said to have been planted in 1936 from budded selections of the best trees of the Zanzibar orange. Individual

yields have been kept since bearing commenced. Total yields for the last four years are shown in the following table :—

Year.	Number of bearing trees.	Total number of oranges.	Average number of oranges per tree.
1942	370	23,259	62
1943	401	203,289	506
1944	337	11,855	52
1945	312	81,644	261
Average	355	80,012	221

70. The fruit from these seedling trees and also from an older collection of trees at Selem Government Plantation were examined in detail as regards the following characters: skin quality and colour, size and shape of fruit, juiciness, number of seeds, quantity of rag, and flavour. After elimination of certain trees on account of poor vegetative characteristics or yield, a tentative selection of 20 trees was made. A list with the seed count of each is given in the following table :—

	Kizimbani.		Selem.	
Selection No.	Tree No.	No. of Seeds.	Tree No.	No. of Seeds.
1	236	17.3	40	2.5
2	156	13.2	44	1.6
3	113	23.8	35	3.8
4	44	20.2	69	2.4
5	73	20.0	66	2.6
6	119	20.8	75	1.4
7	90	9.2	59	8.3
8	62	17.8	42	6.3
9	539	12.0	49	8.0
10	573	8.0	53	11.3

71. A "seedless" variety "Binti Juma" said to have originated at Kwambani in the estate of the late Seyyid Hafidh bin Muhammad el-Busaidi is also in the Government collection. The fruits of this variety show distinct Washington Navel characteristics.

72. In the Kizimbani nursery some 8,000 rough lemon stocks were budded to the selected orange varieties listed above, and also to Valencia obtained from Dunga. Grapefruit varieties included Marsh, Foster, and Triumph. The demand by the public for citrus plants continues to exceed the supply. A common error of most people is to plant the trees far too deeply and to overcome this a skilled labourer is invariably sent with the plants to supervise planting.

73. Citrus scab continues to be a serious disease of the rough lemon stocks. Partial control is obtained by the regular use of Bordeaux mixture. Premature fruit fall, slight in the Kizimbani orchard but serious at Selem, was found to be due to *Alternaria citri*. Scale insects and aphis on the young trees were completely controlled by regular spraying with a mixture of kerosene emulsion and tobacco juice.

74. *Rice*. In view of its importance to the Protectorate this crop has received, as hitherto, considerable attention both at the Experiment Station and in the Districts. The season generally was not very favourable to the paddy crop and large areas were affected by a leaf spot disease, *Helminthosporium*, though in this respect the Langoni valley escaped fairly lightly. As against this, heavy storms and rain in May laid flat a large part of the crop in the experimental area.

75. Eighteen varieties were tested again in the variety trial but, although yields were good, much grain was lost by shattering.

Results were as follows :—

Variety.	Yield in lbs. of dry grain per acre.	Remarks.
Meza	3,581	
Mgazija	3,571	
Kisukari	3,507	
Malikora	3,439	
Moshi	3,417	
Kibawa	3,402	
Sokotera	3,338	
Waya	3,333	
Malikora 19	3,312	Difference required for significance at P=.01 is 659 lbs. per acre.
Shingo la Mjane	3,307	
Mtoto wa Malikora	3,264	
Afaa	3,259	
Sokotera 43	3,222	
Makaniki	3,217	
Ambari	3,153	
N. 90	2,641	
N. 14	2,530	
Cheche	2,440	

As a result of this and previous trials it has now been decided to retain Shingo la Mjane, Mgazija, Waya, Sokotera and the Sokotera "43" selection, Malikora and the Malikora selection, Kisukari, Mtoto ya Malikora, Meza, and Moshi, and to discard the rest.

76. Plots of approximately 1/10th acre each were planted up from single panicle selections made in 1944. As the plots did not form a statistical layout and as considerable damage was done by rain the individual yields are not of sufficient interest to record here, but they will be included in a variety trial in 1946.

77. It is a frequent custom in the Protectorate, either from shortage of seed or transplants, or from a desire to leave enough space to walk about during weeding, or from excessive optimism as to tillering, to leave up to 12″ between individual stands of paddy, and an experiment was drawn up to ascertain the optimum spacing.

The results were quite conclusive.

Spacing.	Average Yield per acre in lbs. of dry paddy.	Remarks.
4″ × 4″	1,987	
5″ × 5″	1,735	
6″ × 6″	1,612	
7″ × 7″	1,556	Amount required for significant difference at P=.01 is 220 lbs./acre.
8″ × 8″	1,326	
9″ × 9″	1,341	
10″ × 10″	1,004	
12″ × 12″	1,041	

78. A manurial trial using lime at 2½ tons per acre, superphosphate 5 cwt. per acre, coconut ash 1 ton per acre, and compost at 10 tons per acre was carried out, but there was no significant difference in the yields.

79. Two rotational cropping trials, to investigate the value of pulse growing and inter-season cultivation have been laid out, but positive results cannot be obtained until next year.

80. A development of great importance to the rice industry of the Protectorate is the introduction, at present only on a demonstrational basis, of parboiling. This process, which, very briefly, consists of soaking overnight and then steaming and drying the paddy before husking, can be done with very simple

materials, and is common to a greater or lesser degree in most rice growing countries. The advantages of this process are as follows:—

1. Greater ease of hulling.
2. An improved hulling out-turn.
3. Fewer broken grains.
4. Generally improved cooking qualities.
5. Improved nutritional value in that less of the valuable aleuron layer is removed in the hulling.

In an experiment where identical samples of ordinary and parboiled paddy were hulled by hand the out-turn was 4.2% in favour of parboiling. In machine hulling the difference is much greater.

81. *Cacao.*—Following a discussion with the Agricultural Adviser to the Secretary of State for the Colonies, Sir Harold Tempany, K.C.M.G., C.B.E., as to the prospects for cacao as a major crop plant in the Protectorate, I proceeded to investigate the matter immediately on taking up my appointment. The only trees to be found in the Protectorate are the survivors from a series of introductions made towards the end of the nineteenth century. From these introductions there were at the time of my arrival a plot of fifty-three trees of Java Criollo on what was previously a Government plantation at Dunga, Zanzibar, and a plot in which the eighteen surviving trees are a mixture of Forastero, Criollo, and possibly hybrids of both, at Kinuni Moshi, a Government plantation in Zanzibar. In Pemba there were eighteen scattered trees at Bule, Mgoli and other places, comprising Java Criollo, Criollo var. Porcelaino (with particularly large seeds and white cotyledons) and some purple seeded varieties. No purple or coloured seeds whatsoever were found in the Dunga plot of Java Criollo and this plot may be taken as a pure isolated strain of that variety. Of particular interest also is one tree of the same variety in the Kinuni Moshi plot where the seeds are pure white and are not apparently influenced by pollen from the surrounding coloured seeded trees. There appears, however, to be a decided pollen influence in the opposite direction, judging by the general light purple colour of the cotyledons in most of the trees The general condition of these old trees, particularly the Java Criollo which is not in any case a hardy type, is a good augury for cacao as an additional major crop for the Protectorate, and the improvement in their condition as a result of some cultural attention has been most marked.

82. Small samples of prepared cacao beans from both the Dunga and Kinuni Moshi plots were sent to the Imperial Institute, London, for examination, the observations on the Dunga sample being as follows:—

> "A pure Criollo type, has shown by the present examination that there are good prospects of producing a high quality cacao from this stock. It would appear that consideration might well be given to the development of this superior type of cacao."

83. The owner of Dunga, Mr. Fazal Mohamed Champsi, has kindly placed the trees on that estate at the disposal of Government for a period of five years for the purpose of collecting propagating material, and full use has been made of all available seeds, all ripe pods being collected fortnightly. At the close of the year the stock of plants was as follows:—

Java Criollo seedlings for planting	...	2,255
Criollo var. Procelaino seedlings for planting	...	410
Forastero Criollo mixture for budding stock for Java Criollo	...	460

84. A small attempt has been made in a six-light propagator (Imperial College of Tropical Agriculture pattern) to produce rooted cuttings. This was not successful, the main cause probably being the age of the stock trees and their exposed condition. The few plants which have been raised in this way will be used for supplying a better type of cutting in future years.

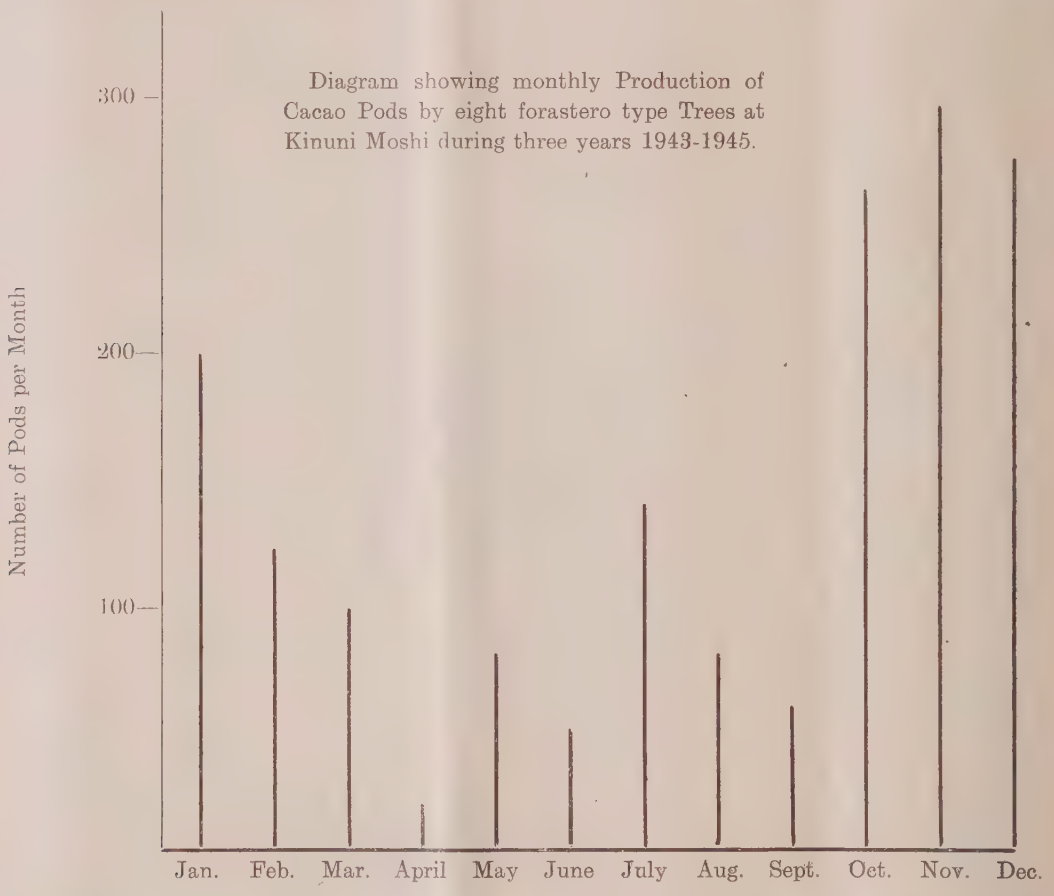
85. The Kinuni Moshi plot was cleared up and the area in amongst the trees planted to Tannias. Complete records for eight of the trees in the plot are now available for three years and are given below :—

PODS PER TREE PER ANNUM.

	Tree Number.							
Year.	1	2	3	4	7	8	9	15
1943	39	113	34	194	80	40	40	88
1944	13	66	11	117	67	21	47	17
1945	26	129	47	83	67	29	118	68
Total	78	309	92	394	214	90	205	173
Average	26	103	31	131	71	30	68	58

It will be observed that several of these trees have produced good and fairly consistent crops, particularly when consideration is given to their condition.

86. Some idea of seasonal production under Zanzibar conditions may be gained from the following diagram based on the yields from the trees at Kinuni Moshi referred to above, the main period of production being, apparently, October to January.



87. The five-acre plot, reserved for cacao planting at Kizimbani, and referred to in my 1944 report, has now been cleared of old tree stumps and thoroughly cultivated and ridged on the contour. Sweet potatoes and cow peas were used as an initial clearing crop, the crop residues and weeds being buried before lining the field at two espacements $8' \times 8'$ and $10' \times 10'$. Half the area is to have permanent shade in the form of *Cassia siamea* and the other half none. Temporary shade, or nurse crops, in the form of cassava, tannias, plantains and bananas have been planted and are growing well in preparation for planting the seedling Java Criollo during the "masika" rains of 1946.

88. The areas suitable for cacao in the Protectorate are generally those sheltered clove localities which have been decimated with sudden death, and of which there is a large area in Zanzibar. It could also be usefully grown in new clove plantings, using clove trees as permanent wind breaks, these being planted

at wider espacements than is the present custom, with several rows of cacao between each. A start has already been made to attract the interest of the planting community for the purpose of making a few small initial plantings on private estates in 1946.

89. *Bananas.*—The planting of the Banana and Plantain plot at Kizimbani was completed during the "masika" rains, the following varieties being included.

Banana, "Kiguruwe", Canary or Governor variety.
Banana, "Ntwike" Local var.
Plantain, "Mzuzu" Local var.
Plantain, "Mkono wa Tembo" Local var.

This plot is sited on a poor leached slope, but the suckers were planted in 3′ × 3′ holes filled with compost, and bananas were being cut from the "Canary" plants ten months after planting. Planting material of these good varieties is being sent to many parts of the island.

90. *Coffee.*—The dry weather has in general affected the coffee crop adversely, but the plot of C. Liberica in the nursery area has continued to improve.
Yields from the Kizimbani plantings are as follows:—

Block.	Variety.	Planted.	Yield of Fresh Berries in lbs.			
			1942	1943	1944	1945
B	C. excelsa	1939	116	380	278	952
D	C. liberica	1938	568	962	820	864

At Mkwajuni, where the rainfall is much less than at Kizimbani, a block of Liberica planted in 1938 has nearly been killed by the failure of the 1945 Vuli. *Coffea robusta* planted in 1937 has not yet fruited, and it does not appear likely that it is suited to Zanzibar conditions.

91. *Derris.*—The possibilities of Derris as an export crop have been explored for some time, and further experiments have been carried out at Kizimbani to ascertain the best method of cultivation. Unfortunately it is not a particularly strong growing crop in Zanzibar and although at present prices the returns are good the labour of lifting is heavy. An acre which yielded 722 lbs. of dried roots showed a nett profit, after paying all cultivation, packing, and shipping expenses, of over Shs. 700.

92. *Kapok.*—In order to make better use of the land Block A at Kizimbani has now been fenced in as a grazing area, and Blocks B. C. and D intercultivated with ground crops. In Block B root cuttings of *Piper nigrum* have been planted against each tree.
Yields are as follows:—

Block.	Origin.	Planted.	Yield in lbs. of lint per tree.					
			1941.	1942.	1943.	1944.	1945.	Average.
A	Java via Malaya	1934	3.64	2.37	0.89	0.72	1.16	1.75
B	Saigon	1938	0.33	1.20	2.22	0.65	1.75	1.23
C	Java and F.M.S.	1938	1.11	0.79	0.79	0.65	1.50	0.97
D	Selewak Sewengam	1938	0.95	1.07	1.04	0.72	2.68	1.29

At present prices Kapok is definitely unprofitable as a plantation crop, but there is a fair local demand for the product and a few trees might be a useful asset to the peasant cultivator.

93. *Papaws.*—A large block of three varieties of papaw has been planted with a view to conducting investigations into the production of Papain.

94. *Cassava.*—The cassava variety trial was unfortunately invalidated by theft, but the following figures give the average yield in lbs. per plant actually harvested.

Variety.	No. Plants harvested.	Total Field Weight lbs.	Average Yield per plant in lbs.
Msitu	21	359	12.3
K 91	64	538	9.9
K 50	74	636	8.5
K 86	98	806	8.2
K 64	65	490	7.5
K 127	39	280	7.2
K 52	116	764	6.5
K 65	64	376	5.8
K 11	84	439	5.1

It will be noticed that Msitu, the highest yielder ever tested at Kizimbani, still retains the lead as regards weight of roots per plant. Seedling progeny of "Msitu" is being multiplied and tested for resistance to mosaic disease and yield, and large areas of "Msitu" itself are being grown for distribution to cultivators.

95. *Chillies.*—The present state of the market for Bird's-eye-Chillies, and the consequent raising of the guaranteed purchase price by the Clove Growers Association has resulted in a revival of interest in this crop, and further selection work with a view to increasing the size of the fruit has been started. For one reason or other the average size of the Zanzibar chillie is so small that harvesting costs are very heavy, and this, combined with its unpleasant handling properties, has helped to retard its popularity as a cash crop.

96. *Miscellaneous.*—The station continues to grow all the other common food crops of the island, many kinds of garden and field beans, cover crops, and any other agricultural product which might prove to be of economic value or dietary advantage to the Protectorate. Recent introductions are Soya Beans from Uganda. Cinchona from the United States, and the Bambarra ground nut. In addition, an extensive area of vegetables is cultivated, mainly for the provision of planting material for those of the local population who are interested.

97. *Stenotaphrum dimidiatum.* "*Pemba Grass*".—Mention might be made of this grass, which has remarkable qualities in rapidly forming a close thick herbage which is extremely effective in suppressing weeds, constituting a complete soil cover, and checking erosion. It is particularly valuable in protecting the sloping sides of drains and irrigation channels, and in choking weed growth on bunds in rice fields. In addition to this it is a valuable and nutritious cattle fodder.

VETERINARY AND ANIMAL HUSBANDRY.

98. *Livestock Diseases.*—Apart from East Coast Fever which is enzootic in the Protectorate, and Trypanosomiasis, which is present in Zanzibar only, the health of the cattle population has remained good and there have been no serious outbreaks of disease.

99. As the result of discussions following a preliminary visit of the Director of Veterinary Services, Tanganyika Territory, in connection with Colonial Development and Welfare Scheme R 33 for an intensive survey of cattle diseases in Zanzibar and Pemba, it has been decided to attempt to eradicate East Coast Fever from both islands, and to this end sufficient dips are to be constructed to render the regular dipping of all cattle possible. If this can be achieved there is no reason why the additional natural increase in the cattle population should not be sufficient to remove the necessity for the importation of slaughter stock for Zanzibar.

100. During the year it has been definitely established that the tsetse fly (*Glossina austeni*) is present and fairly widely distributed in Zanzibar. A visit to the island has been made by an Entomologist from the Tanganyika Department of Tsetse Research, and pending his report it will not be possible to decide whether a policy of eradication is to be attempted or local control in selected areas. Rather curiously it appears almost certain that neither tsetse nor trypanosomiasis exists in Pemba.

101. There have been several outbreaks of a severe epidemic poultry disease which has not as yet been definitely diagnosed, but which is suspected to be Newcastle virus. Unfortunately nearly 90% of the Kizimbani flock succumbed to this during November.

102. A Laboratory and Office for the Veterinary Officer were completed during the year and plans are on foot for the complete fencing of the Marhubi Quarantine area. This latter is most necessary as at present Zanzibar is normally free from most of the major enzootics, including rinderpest. An Assistant Veterinary Officer has been posted to Pemba and a veterinary organization is being built up there.

103. The following animals were imported from the mainland:—

Oxen	...	2,076
Cows	...	268
Calves	...	140
Goats	...	11,061
Sheep	...	901
Donkeys	...	91
Camels	...	112

104. Animals slaughtered at the Zanzibar abattoir during the year were as follows:—

	Oxen.	Goats.	Sheep.	Camels.
Imported Stock	2,183	10,108	666	84
Local Stock	149	1,287	68	—
Total	2,332	11,385	734	84

In Pemba 2,368 bovines were slaughtered during the year, all being local stock.

Stock Farm.

105. *Cattle.*—The year has been one of steady progress, assisted by funds made available under the Colonial Development and Welfare Act, Scheme No. D.188, and, as will be seen by the following table, the "Milk Index", or average daily milk production per cow in lbs, has been substantially higher than the average of the previous three years.

Average.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Whole Year.
1942-44	6.2	6.2	6.1	5.6	5.2	5.1	5.2	5.1	5.7	6.9	6.2	6.9	5.9
1945	7.3	7.0	6.8	6.0	6.3	6.7	6.6	6.0	6.2	7.0	7.2	7.5	6.7

This increase is despite the fact that six Pemba heifers averaged only 61 lbs. for their whole lactations, mainly owing to their refusal to adapt themselves to hand milking.

106. Thirty-seven calves were born during the year and mortality, despite the difficulties attached to rearing on the bucket, was only two, or 5.4%. Live weight gains for all unweaned calves was 3.3 lbs. per week for the first six months of the year and 4.8 lbs. for the second six months.

107. Much of the grazing land is still in poor condition but a very great degree of improvement has been effected, as mentioned in the Annual Report for 1944, by fencing and folding cows on a restricted area at night. In areas where this has been done weeds and poor grasses have almost completely disappeared the dominant species now being *Panicum trichocladum*, *P. brevifolium*, *Dolichos hosei*. In addition, one paddock has been planted up to Pemba grass (*Stenotaphrum dimidatum*) with the object of studying the reaction of a pure stand of this valuable grass to controlled grazing.

108. The health of the herd was good. Fifteen animals were treated for Trypanosomiasis with phenanthridinium F 987, and in every case but one a cure was effected. There was one death from Haemonchiasis, one from Tetanus, and one from East Coast Fever. Unfortunately, nine yearlings were lost in June owing to one of the open sheds catching fire during the night. Four cases of East Coast Fever, one of which as already recorded was fatal, arose through inability to dip certain animals owing to burns sustained in this fire.

109. Ventilation of the cowshed was greatly improved by the erection of a raised ridge to the roof; and a milk and can storage room completed. As the result of a report on the milk supply of the Protectorate prepared by Dr. M. Harvey the whole question of the Mtoni Dairies and Grazing Area was reviewed, and funds have been made available for comprehensive improvements in the drainage and layout of the area. In addition, 600 acres of Government land at Chukwani are being prepared as an overflow grazing area for dry cows and young stock. It is hoped that this will both check the erosion of which there are already signs and also be a substantial contribution to an increase in the milk supply of the Protectorate.

110. *Goats.*—The nucleus of a small herd of Indian Milk Goats was built up during the latter half of the year by purchases in the Town and further animals have since arrived from Tanganyika Territory. These have been completely stall fed on cassava, sweet potatoes, simsim cake, grass and leaves together with a small quantity of salt and bone meal. In addition, whenever possible, molasses was added to the drinking water in order to encourage the consumption of a sufficient quantity. Of three kids born two were successfully raised on the bucket and one died. The ration was 1 to 4 lbs. of milk a day according to age and weaning took place at three months.

111. *Poultry.*—Nearly the whole of the Rhode Island Red flock at Kizimbani was wiped out by a disease suspected to be Newcastle virus.

112. Egg records showed an average of 117 eggs per bird for those kept in pens and 46 per bird for those on free range. Fertility of eggs set in incubators averaged 70.25%. Some 23 Rhode Island Red cocks were distributed to bona fide peasants who fulfilled the condition that all their native type cocks should be slaughtered or sold. In Pemba the 13 birds which were laying throughout the year averaged 150 eggs. 15 Rhode Island Red cockerels were sold to the public.

PRODUCE INSPECTION.

113. A staff of inspectors in Zanzibar and Pemba continue to examine all cloves, copra, chillies and mangrove bark prior to export under powers given in legislation dealing with the adulteration of produce, and also in the case of cloves and chillies in legislation dealing with the exportation of agricultural produce. Brightness of colour characterized the small Vuli crop of cloves delivered at the end of the year.

114. The quantities of cloves passed for export in their grades are shown in the table below :—

Inspection and Grading of Cloves Prior to Export (1945).

Month.	Grade II Bales.	Grade III Bales.	Total Passed Bales.
January	16,143	7,050	23,193
February	3,363	—	3,363
March	4,998	—	4,998
April	7,832	3,450	11,282
May	8,790	—	8,790
June	977	362	1,339
July	10,052	5,450	15,502
August	11,577	1,650	13,227
September	2,130	—	2,130
October	10,751	1,552	12,303
November	13,808	—	13,808
December	4,061	—	4,061
Total	94,482	19,514	113,996

115. The results of the examination of cloves, clove stems and copra for excessive moisture or extraneous matter are shown below :—

Examination of Cloves, Clove Stems, and Copra for Adulteration during 1945.

Cloves in Bags.

Origin.	Total Deliveries.	Passed.	Failed for : Excessive Moisture.	Extraneous Matter.	Per cent Failures.
Zanzibar	25,879	23,603	1,948	328	9%
Pemba	76,916	75,586	1,306	24	2%
Total	102,795	99,189	3,254	352	

CLOVE STEMS IN BAGS.

Origin.	Total Deliveries.	Passed.	Failed for: Excessive Moisture.	Failed for: Extraneous Matter.	Per cent Failures.
Zanzibar	16,799	16,358	72	369	3%
Pemba	Nil	Nil	Nil	Nil	
Total	16,799	16,358	72	369	

COPRA IN BAGS.

Zanzibar	159,634	146,556	12,338	740	8%
Pemba	62,894	62,743	151	—	
Total	222,528	209,299	12,489	740	

Ninety-nine samples of clove and clove stem oil and one hundred and six samples of coconut oil were taken and forwarded to the Government Analyst.

116. The inspection of mangrove bark has thrown a good deal of additional work on to the staff, and the Inspector of Produce, Mr. A. C. E. Callan, and his staff are to be complimented on the keenness with which they have undertaken this new work, and the success which has accompanied it; 2,718 tons were passed for export subsequent to the legislation being passed.

CHEMICAL LABORATORY.

117. The Government Chemist, Mr. L. W. Raymond, continued on secondment to the Secretariat but was able to supervise the work of the Laboratory and to undertake occasional work of particular importance. He reports as follows:—

General Analyses.—The total number of samples received was 931. Of these 916 were from Government Departments, 1 from the Clove Growers Association and 14 from private firms. Fees accruing to Government for samples analysed for private firms, and for the certification of clove oil for export amounted to Shs. 345.00.

Details of the samples are as follows:—

Agriculture Department.—Cloves, 290, clove stems, 6; clove oil, 3; clove stem oil, 96; cattle dips, 94; soils, 42; coconut oil, 106; water, 12; milk, 2; mangrove bark, 3; artificial fertilizers, 8; palm oil, 1; coral dust, 1; Total, 664.

Health and Medical Department.—Milk, 171; evaporated milk, 1; cattle dip, 1; Total, 173.

Police Department.—Opium, 3; bhang, 40; liquor, 10; milk, 1; gunpowder, 1; kerosene, 1; toxicological exhibits (the examination of which was later found unnecessary), 14; Total, 70.

Customs Department.—Liquor, 1; methylated spirits, 4; vinegar, 1; Total, 6.

Other Departments.—Public Works: Water, 2. Post Office: Postal cover, 1. Total, 3.

118. Notes on the more important samples.

Agriculture.—The experiment on the development of acidity in cloves during storage was discontinued at the end of April. During the first four months 284 samples were examined. The quality of clove bud and stem oils from the Distillery of the Clove Growers Association was good throughout the year. The 99 samples examined represented 510,516 lbs. of stem oil and 1,097 lbs. of bud oil, a total of over 228 tons. The eugenol content of all the samples was determined. That of bud oil ranged from 92.0 to 94.5 per cent, and of stem oil from 90.0 to 94.0 per cent. Only 11 samples of stem oil had an eugenol content below 92.0 per cent, the average of the 96 samples being 92.4 per cent. The refractive index (at 20°C) of stem oil varied from 1.5348 to 1.5378.

119. Of 94 samples of cattle dipping fluid 32 were of correct arsenical strength, 16 were over and 46 under strength. In 5 cases the excess of arsenic was 10 per cent or over, and in 10 cases the deficiency exceeded 10 per cent, being in one instance 25 per cent.

120. Moisture was determined in 30 samples of soil from the Kizimbani Regeneration Plots. The examination of samples from these plots was discontinued at the end of January.

121. There was an increase in the number of samples of coconut oil examined for export. Of 106 samples submitted by the Inspector of Produce all were from bulks of industrial quality of oil. Only two failed; the acidity, as lauric acid, of one was 9.3 per cent and the other contained 1.2 per cent moisture (limit 1.0 per cent). All samples were examined for moisture, matter insoluble in petroleum ether, acidity and colour.

122. Monthly chemical examinations of the Zanzibar Public Water Supply were continued, and the results were uniformly good. The following table gives the range of analytical figures on 12 samples.

	Parts per 100,000
Total solids (dried at 105° C)	34.2 —35.1
Alkalinity (as Calcium Carbonate)	30.0 —30.8
Chlorides (as Sodium Chloride)	2.3 — 2.8
Nitrogen in free and saline ammonia less than	0.001 — 0.002
,, in albuminoid ammonia	0.001 — 0.002
,, in nitrates	0.008 — 0.012
,, in nitrites	Nil
Oxygen absorbed from Potassium permanganate (4 hours at 80° F.)	0.0031— 0.0053

123. Miscellaneous examinations for the Department of Agriculture included palm oil (lauric acid, 3 per cent), coral dust (calcium carbonate, 90.3 per cent), and 8 artificial fertilizers for identification. Samples of mangrove bark awaited examination at the end of the year. A sample of milk from Kizimbani gave fat, 6.3 per cent, solids-not-fat, 9.1 per cent.

124. *Health.*—There was a great increase in the number of samples of milk received from the Sanitary Superintendent. Some of the samples were taken in connection with Dr. Harvey's enquiry into the Zanzibar milk supply, and 22 were from individual cows in herds. In these single cow samples fat varied from 2.1 to 6.9 per cent and solids-not-fat from 8.2 to 9.8 per cent, the averages being: fat, 4.2 per cent and solids-not-fat, 8.7 per cent. Of the 148 samples taken from the supplies of dairies and individual vendors, 116 were passed and 32 were found to be below the standard prescribed under the Public Health Rules (fat 3.0 per cent; solids-not-fat, 8.5 per cent). The average composition of the samples passed was: fat, 4.0 per cent, solids-not-fat, 9.1 per cent, water, 86.9 per cent. Of the 32 samples reported as below standard 8 were deficient in fat only (deficiency varying from 3.3 to 30.0 per cent), 15 were deficient in solids-not-fat only (deficiency varying from 1.2 to 28.8 per cent) and 9 were deficient in both fat and solids-not-fat. The worst sample was 26.6 per cent deficient in fat and 57.4 per cent deficient in solids-not-fat. Successful prosecutions were instituted in most cases. One skimmed milk gave 0.1 per cent fat, 9.4 per cent solids-not-fat. The statement as to equivalence on the label of a tin of evaporated milk was verified.

125. *Police.*—Opium was identified in three exhibits, one of which was a mixture prepared for smoking. Of 40 exhibits examined for bhang, 9 consisted of mixtures of bhang and tobacco, 30 were bhang and 1 was tobacco.

126. Two liquids suspected to be whisky were found to be non-alcoholic. One native liquor contained 5.4 per cent by volume of alcohol. Of seven exhibits stated to have been sold as "vinegar" six contained alcohol (5.5 to 7.4 per cent) and acetic acid (1.28 to 1.45 per cent); the seventh contained 2.73 per cent acetic acid.

127. One sample of milk submitted by the Police was grossly adulterated: deficiency of fat was 20.0 per cent and of solids-not-fat 36.4 per cent.

128. A powder suspected to be gunpowder was non-explosive. One sample of "kerosene" consisted of 14.5 per cent kerosene, 85.5 per cent water.

Customs, Port and Marine.—A sample of gin contained 43.13 per cent by volume of alcohol. Four samples of methylated spirit were found to be correctly denatured. A liquid imported as "native vinegar" contained 3.5 per cent of acetic acid and 3.4 per cent of alcohol.

130. *Public Works Department.*—Two samples of water from a well taken during a pumping test were fully analysed : they contained 340 and 428 parts per 100,000 of chlorides (expressed as sodium chloride).

131. *Post Office.*—A registered cover was examined, and the conclusion was reached that it had been opened and re-closed after the original post office cancellations were made, but before cancellation at subsequent offices.

132. *Clove Growers Association.*—A sample of water was fully analysed as to its suitability for boiler-feed purposes.

133. *Private Samples.*—One sample of soap was analysed for a local manufacturer. Other samples submitted in connection with cargo surveys and insurance claims included tins of metal polish, cardboard cartons, wrapping papers, gunny bag and cloth. Three hundred and eighty-two written reports were issued during the year.

134. *Miscellaneous.*—The Laboratory continued to make up sodium arsenite baits for poisoning wild pig, 4,250 being issued to the District Administration during the year.

SECTION III.

LEGISLATION.

135. The following legislation was enacted during the year.

Government Notice No.			13—The Defence (Preparation of Rice Land) (Pemba) Order, 1945	4.1.45
,,	,,	,,	110—The Defence (Planting of Sweet Potatoes) (Zanzibar) Order, 1945	12.4.45
,,	,,	,,	157—The Defence (Planting of Sweet Potatoes) Order, 1945	6.6.45
,,	,,	,,	181—The Defence (Planting of Pulses and Sweet Potatoes) (Pemba) Order, 1945	29.6.45
,,	,,	,,	337—The Defence (Planting of Sweet Potatoes) (Zanzibar) Order, 1945	15.11.45
,,	,,	,,	338—The Defence (Preparation of Rice Land) Order, 1945	15.11.45
,,	,,	,,	397—The Defence (Preparation of Rice Land) (Pemba) (No. 2) Order, 1945	21.12.45
,,	,,	,,	34—The Diseases of Animals (Movement of Fowls) Rules, 1945	18.1.45
,,	,,	,,	178—The Plant Protection (Importation of Cacao) Order, 1945	27.6.45
,,	,,	,,	226—The Agricultural Produce Export (Mangrove Bark) Rules, 1945	1.8.45
,,	,,	,,	235—Declaration of Mangrove Bark to be Produce under the Agricultural Produce Export Decree (Cap. 116)	2.8.45
,,	,,	,,	236—Declaration of Mangrove Bark to be Produce under the Adulteration of Produce Decree (Cap. 120)	2.8.45

The first seven notices relate to cultivation and planting orders made under the Defence (Land Requisition and Personal Service) Regulations, 1943, for the purpose of ensuring that the campaign for increased food production was not relaxed.

136. Government Notice No. 34 made under the Diseases of Animals Decree (Cap. 128) prohibits the movement of fowls including chickens, ducks, turkeys, geese, guinea fowls or pigeons from Zanzibar to Pemba and vice versa except under a written permit from an authorised officer. These rules were made to prevent the spread of disease from one island to another.

137. Government Notice No. 178 made under the Plants Protection Decree, 1937, prohibits the importation into the Protectorate of the cacao plant or any part or fruit or seed thereof (other than in its manufactured state) except under a written permit issued by the Director of Agriculture. The object of this order was to prevent the introduction of disease likely to affect Cacao in the Protectorate.

138. By Government Notice No. 226 the Agricultural Produce Export Decree (Cap. 116) was made applicable to mangrove bark and by Government Notices Nos. 235 and 236 mangrove bark was declared to be produce for purposes of the Agricultural Produce Export Decree (Cap. 116) and the Adulteration of Produce Decree (Cap.120).

ACKNOWLEDGMENT.

139. I wish to record my appreciation of the loyal and enthusiastic service given by the staff of the Department, particularly by those who, due to war conditions, have been long overdue for leave. I wish also to acknowledge with gratitude the ready co-operation of the District Administration; both headquarters and district staff in the many matters which concern both Departments. The close interest of His Excellency the British Resident, Sir Guy Pilling, K.C.M.G., the Acting British Resident Major E. A. T. Dutton, C.B.E., and the Acting Chief Secretary Mr. R. W. Baker-Beall, M.B.E., has greatly encouraged, not only myself personally, but all members of the staff with whom they came into contact during their frequent inspections of departmental activities.

140. The Government is deeply indebted to Mr. H. J. Lowe, C.B.E. Director of Veterinary Services to the Government of Tanganyika Territory for the considerable assistance which Mr. Lowe has continued to afford in a voluntary advisory capacity on many matters concerning animal health.

R. O. WILLIAMS,
Director of Agriculture.

Zanzibar, 14th February, 1946.

APPENDIX I.

Statement of Revenue and Expenditure of Government Plantations.

REVENUE.

	Shs.	Cts.	Shs.	Cts.
Cloves	4,143	96		
Coconuts	138,245	52		
Miscellaneous	5,904	00		
Leased Plantations	1,770	00		
	150,063	48		
Less value of produce brought over from 1944 ...	3,818	00		
	146,245	44		
Add, value of produce carried over to 1946 ...	2,138	62		
			148,384	06

EXPENDITURE.

	Shs.	Cts.	Shs.	Cts.	Shs.	Cts.
(1) Headquarters Division.						
Personal Emoluments	31,798	89				
Other Charges	718	80				
			32,517	69		
(II) Field Division.						
Personal Emoluments	8,099	42				
Other Charges	115,312	33				
			123,411	75		
					155,929	44
Expenditure exceeds Revenue by Shs.					7,545	38

APPENDIX II.

Approximate Production of Cloves in Frasilas of 35 lbs. for 35 Crop Years. (1st July to 30th June).

(Based on receipts of cloves at the Central Market and C.G.A.).

(See explanation as per para. 5.)

Season	Zanzibar	Pemba	Total	Mean Crop per season in five year periods.
	Fras.	Fras.	Fras.	Fras.
1910/11	52,100	139,307	191,407	—
1911/12	216,507	582,153	798,660	—
1912/13	31,018	104,368	135,386	—
1913/14	145,586	638,094	783,680	—
1914/15	194,920	339,389	526,309	487,100
1915/16	141,641	655,116	796,757	608,200
1916/17	208,716	302,919	511,635	550,800
1917/18	63,958	234,239	298,197	583,300
1918/19	259,273	565,229	824,502	591,500
1919/20	93,847	168,703	262,550	538,700
1920/21	231,831	316,446	548,277	489,000
1921/22	65,819	200,983	266,802	440,100
1922/23	291,417	690,498	981,915	576,800
1923/24	75,017	236,767	311,794	474,300
1924/25	240,952	520,490	761,442	574,000
1925/26	219,192	392,622	611,814	586,800
1926/27	203,843	529,186	733,029	680,000
1927/28	190,370	500,382	690,752	621,800
1928/29	74,828	125,740	200,568	599,500
1929/30	318,647	610,296	928,943	633,000
1930/31	51,796	201,320	253,116	561,300
1931/32	175,070	760,786	935,856	601,800
1932/33	242,772	244,594	487,366	561,200
1933/34	146,098	781,090	927,188	706,500
1934/35	360,037	503,415	863,452	693,400
1935/36	65,938	232,571	298,509	702,500
1936/37	45,096	351,568	396,644	594,600
1937/38	446,500	909,416	1,355,916	768,300
1938/39	39,879	115,211	155,090	612,000
1939/40	168,041	501,474	669,515	575,100
1940/41	146,323	575,277	721,600	655,700
1941/42	297,578	889,550	1,187,128	817,800
1942/43	40,049	223,691	263,740	599,400
1943/44	263,423	777,218	1,040,641	776,500
1944/45	200,417	459,386	659,813	774,584
Average for 35 seasons	171,672	439,186	610,858	

1st Order Station.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT [illegible], 1945.

Lat. : 6° 15′S Long. : 39° 13′E Alt. : 69 feet. Standard Time 3h 00m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				Number of Days of
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Max. Fall in 24 hrs.	Date	Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.			
	F	F	F	F	%	%	F	F	F	F	F			ins.		
January ...	81.4	87.1	76.5	77.0	85	72	95.0	72.7	89.7	76.0	82.9	78.2	3.08	1.33	25	11
February ...	82.5	90.2	76.5	77.7	82	67	99.1	74.4	92.9	76.4	84.7	43.2	1.70	1.09	24	6
March ...	81.3	85.6	77.7	77.4	89	76	94.0	73.1	89.3	76.2	82.7	320.5	12.62	2.83	20	19
April ...	80.8	85.5	77.4	77.2	89	76	93.0	74.0	87.8	77.6	82.7	227.8	8.97	2.90	12	10
May ...	77.8	80.8	74.3	74.1	89	80	88.0	71.1	83.4	74.7	79.1	232.7	9.16	1.42	7, 18	21
June ...	75.6	81.6	68.5	68.0	79	63	86.0	69.0	82.9	73.2	78.1	4.3	0.17	0.17	26	1
July ...	74.7	80.7	70.2	69.3	86	68	84.5	70.0	82.0	72.0	77.0	20.3	0.80	0.33	23	5
August ...	75.2	81.8	70.9	69.1	87	65	84.6	69.8	83.4	72.5	77.9	4.6	0.18	0.18	14	1
September ...	76.2	83.1	72.0	70.3	87	66	88.2	68.0	85.0	71.3	78.1	65.3	2.57	1.03	2	8
October ...	78.4	83.5	73.4	73.2	85	72	93.7	68.4	86.3	71.6	78.9	79.5	3.13	1.26	13	9
November ...	80.9	85.4	75.9	75.7	84	73	95.5	72.6	88.0	74.3	81.1	115.3	4.54	1.80	21	11
December ...	82.0	88.4	75.9	76.3	82	68	94.9	72.4	90.4	75.2	82.8	83.3	3.28	1.17	14	13
Year ...	78.9	84.5	74.1	73.8	85	71	99.1	68.0	86.8	74.3	80.5	1275.0	50.20	2.90	12th Apr.	115

2nd Order Station.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT VICTORIA GARDENS, ZANZIBAR, 1945.

Non-Clove Growing Area.

Lat. : 6° 10′S Long. : 39° 11′E Alt. : 18 feet. Standard Time 3h 00m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				Number of Days of
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Max. Fall in 24 hrs.	Date	Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.			
	F	F	F	F	%	%	F	F	F	F	F			ins.		
January ...	81.5	87.1	75.7	75.9	83	69	91.3	74.0	89.0	76.6	82.8	73.9	2.91	0.87	25	13
February ...	82.3	88.5	75.9	75.9	81	66	93.5	75.0	90.5	77.2	83.9	51.6	2.03	1.21	24	6
March ...	81.9	85.7	77.2	77.0	86	75	92.0	74.8	88.7	76.2	82.5	180.8	7.12	1.28	21	19
April ...	81.3	85.1	77.2	76.8	87	76	91.0	73.8	87.3	77.4	82.3	243.6	9.59	3.60	30	14
May ...	78.1	81.3	74.7	74.1	89	79	88.3	71.4	83.5	74.7	79.1	309.1	12.17	3.80	7	21
June ...	76.0	82.4	69.4	69.1	80	64	86.5	68.0	83.5	73.0	78.3	14.5	0.57	0.47	26	3
July ...	74.9	81.3	70.5	69.3	86	67	85.5	68.3	82.6	71.6	77.1	29.7	1.17	0.62	5	7
August ...	75.0	82.9	70.7	68.5	87	62	86.0	68.5	84.1	71.2	77.7	13.5	0.53	0.22	14	5
September ...	75.9	83.8	72.0	71.1	87	65	88.0	67.0	85.3	69.9	77.6	59.4	2.34	0.61	3	11
October ...	78.2	82.6	73.0	71.8	84	70	88.3	67.0	84.5	70.3	77.4	116.8	4.60	1.70	16	12
November ...	80.7	83.4	75.2	74.8	83	75	90.8	71.0	87.0	73.1	80.1	158.2	6.23	2.07	21	17
December ...	81.5	87.5	75.4	75.0	82	67	92.0	71.5	89.1	75.5	82.3	136.4	5.37	2.46	14	10
Year ...	78.9	84.3	73.9	73.3	85	70	93.5	67.0	86.3	73.9	80.1	1387.5	54.63	3.80	7th May	138

Temperature Station.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT KIZIMBANI, ZANZIBAR, 1945.

Lat. : 6° 05′S Long. : 39° 16′E Alt. : 220 feet. Standard Time 3h 00m East.

Clove Growing Area.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				Number of Days of
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Max. Fall in 24 hrs.	Date	Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.			
	F		F		%		F	F	F	F	F			ins.		
January ...	81.0		71.8		73		87.0	71.8	86.5	73.6	80.1	73.2	2.88	0.87	29	11
February ...	82.0		73.4		75		91.0	71.0	87.9	73.1	80.5	11.7	0.46	0.20	28	9
March ...	81.2		75.7		83		90.0	70.0	86.7	72.9	79.8	294.6	11.60	2.86	21	19
April ...	80.4		76.3		87		90.0	71.2	85.3	73.8	79.5	199.6	7.86	2.00	13	20
May ...	77.1		73.2		87		85.2	69.1	82.9	72.1	77.5	381.0	15.00	2.28	7	25
June ...	75.4		67.1		75		84.8	63.6	82.0	69.8	75.9	37.3	1.47	1.00	26	5
July ...	73.7		70.0		87		83.5	63.0	81.1	68.7	74.9	59.9	2.36	0.80	21	10
August ...	74.5		70.2		86		83.0	62.0	81.5	67.3	74.4	40.6	1.60	0.92	14	7
September ...	76.3		70.5		82		85.0	64.0	82.4	67.1	74.7	77.7	3.06	0.47	3	13
October ...	78.5		70.7		77		84.8	64.0	83.4	68.5	75.9	69.3	2.73	0.52	1	11
November ...	80.7		71.8		74		86.8	68.0	84.1	70.9	77.5	164.3	6.47	1.45	13	20
December ...	81.0		71.4		73		88.1	69.8	85.5	72.9	79.2	50.5	1.99	1.20	14	6
Year ...	78.5		71.8		80		91.0	62.0	84.1	70.9	77.5	1459.7	57.48	2.86	21st Mar.	156

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT WETE, PEMBA 1945.

Temperature Station.

Lat. : 5°04′S Long. : 39° 43′E Alt. : 60 feet. Standard Time 3h 00m East.

Clove Growing Area.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				Number of Days of
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. - Min.	Total		Max. Fall in 24 hrs.	Date	Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.			
	F		F		%		F	F	F	F	F			ins.		
January ...	81.9		75.7		82		90.0	72.5	87.2	75.1	81.1	112.0	4.41	1.24	8	12
February ...	83.9		76.1		77		92.0	72.0	89.2	75.4	82.3	9.7	0.38	0.27	26	3
March ...	93.3		77.0		81		90.5	73.5	88.5	74.9	81.7	208.5	8.21	1.33	17	22
April ...	81.4		76.5		85		90.0	72.5	87.1	75.1	81.1	350.0	13.78	1.74	13	24
May ...	77.6		74.1		89		85.5	70.0	81.2	72.9	77.1	815.3	32.10	3.58	17	28
June ...	76.6		68.9		77		84.5	64.5	81.4	70.6	76.0	63.5	2.50	0.57	8	19
July ...	76.3		70.2		81		83.9	66,1	81.2	69.8	75.5	50.0	1.97	0.86	23	13
August ...	76.3		70.3		82		83.6	67.0	81.7	69.5	75.6	44.4	1.77	0.28	14	15
September ...	77.6		71.1		80		84.9	66.0	82.9	69.0	75.9	56.6	2.23	0.62	12	14
October ...	80.4		71.6		75		87.8	66.1	85.1	69.7	77.4	33.3	1.31	0.35	16	11
November ...	80.9		74.1		80		89.0	71.1	85.8	72.6	79.2	238.5	9.39	2.27	23	15
December ...	82.1		74.1		77		89.0	70.3	87.2	74.6	80.9	19.3	0.76	0.37	30	5
Year ...	79.9		73.3		81		92.0	64.5	84.9	72.4	78.7	2001.1	78.81	3.58	17th May	181

Rainfall Station: **SUMMARY OF METEOROLOGICAL**

Lat.: 6°09'S Long.: 39° 16'E Alt.: 80 feet. Standard Time 3h 00m East.

Month	Temperature				Relative Humidity		Rainfall				Number of Days of
	Dry Bulb		Dew Point		h	h	Total		Max. Fall in 24 hrs.	Date	Rain
	8.30	14.30	8.30	14.30	8.30	14.30	mm.	ins.			
	F		F		%				ins.		
January ...	81.3		75.9		83		100.8	3.97	1.30	29	10
February ...	81.5		75.4		81		116.1	4.57	2.50	24	9
March ...	80.6		76.3		86		367.3	14.46	3.10	5	20
April ...	82.8		76.5		81		262.4	10.33	2.50	15	18
May ...	79.3		74.1		84		515.9	20.31	2.70	14	25
June ...	81.0		70.3		69		56.6	2.23	1.60	25	7
July ...	79.2		68.9		70		45.2	1.78	0.74	1	9
August ...	80.4		68.5		66		129.8	5.11	1.29	3	8
September ...	78.9		71.1		77		43.2	1.70	0.41	3	10
October ...	80.8		72.0		74		64.0	2.52	0.40	20	15
November ...	81.7		72.0		76		103.1	4.06	0.50	11	19
December ...	85.3		72.5		65		52.1	2.05	0.50	14	13
Year ...	81.1		72.8		76		1856.5	73.09	3.10	5th Mar.	163

RAINFALL STATIONS, 1945.

Month	CLOVE GROWING AREAS																		NON-CLOVE GROWING AREAS					
	Dole		Selem		Mkokotoni		Mkwajuni		Kigomasha		Matanga-twani		Mkoani		Mtambile		Limbani		Wesha		Chwaka		Makunduchi		Bweleo	
	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days
January ...	2.05	7	4.41	12	2.72	3	4.31	8	0.75	7	3.97	7	4.52	11	4.59	15	6.15	9	1.84	10	3.61	13	4.93	7	3.49	13
February ...	1.77	7	1.56	8	1.03	2	0.30	3	0.62	3	1.32	3	0.39	2	3.75	5	1.54	3	1.58	4	4.17	9	1.56	3	3.38	7
March ...	10.31	15	11.51	20	3.37	3	5.83	20	3.33	8	6.17	12	9.41	18	10.60	21	6.65	16	7.28	20	5.66	13	5.78	10	10.81	18
April ...	8.36	11	11.21	22	8.50	6	11.38	24	7.52	17	12.84	24	19.29	22	22.27	26	14.37	23	14.93	21	9.79	17	10.37	8	6.17	11
May ...	14.29	21	13.41	25	15.00	15	16.02	27	24.72	28	27.07	27	40.92	27	41.31	26	32.79	28	32.58	26	20.69	26	26.58	20	12.46	19
June ...	2.26	4	1.10	3	1.11	2	0.62	6	3.89	13	4.06	14	3.06	13	2.50	15	2.81	17	3.54	19	0.72	8	2.40	7	1.03	3
July ...	2.32	5	2.60	9	1.80	1	2.43	10	2.07	12	2.01	10	4.19	12	2.38	15	1.96	11	1.60	12	2.56	13	2.63	5	0.84	4
August ...	1.29	6	2.28	11	2.93	11	3.01	16	4.01	12	2.21	13	0.88	9	0.58	8	1.04	7	1.25	10	1.43	10	1.20	3	0.59	4
September ...	3.36	11	4.80	17	5.29	9	2.04	11	4.56	13	2.26	12	3.13	9	1.83	9	3.61	12	1.81	10	3.78	10	1.78	5	2.34	7
October ...	1.80	10	3.08	13	0.98	5	1.40	8	2.99	12	1.76	8	1.36	6	2.80	8	1.02	6	1.58	7	1.13	8	1.03	2	3.09	7
November ...	7.29	17	7.47	22	3.27	8	3.06	8	6.07	14	14.99	18	7.09	16	7.09	13	11.02	16	5.89	14	*2.70	*5	3.81	6	6.25	6
December ...	3.05	9	4.59	7	1.15	2	1.56	3	0.03	1	0.59	5	2.09	5	5.27	12	0.98	5	2.98	12	1.46	5	1.27	2	3.22	6
Total 1945 ...	58.15	123	68.02	169	47.15	67	51.96	144	60.56	140	79.25	153	96.33	150	104.97	173	83.94	153	76.86	165	57.70	137	63.34	78	53.67	105
Total 1944 ...	76.40	170	79.16	207	45.95	72	66.67	156	71.74	140	79.16	175	78.14	151	78.99	181	105.85	155	77.21	154	60.80	165	66.02	95	†	†

Note: Rainfall in inches.

*No record for November, 1945. Figure represents average of previous 8 years (1934 - 1941).

†No records for 1944.